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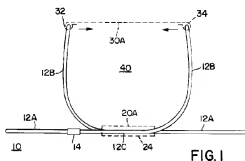
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(54) **Self-erecting Portable Structure & Method.**

(57) A self erecting portable structure comprising :
a first fabric means having first sleeves at each end forming a first surface (20A) ;
a second fabric means having second sleeves at each end for forming a second surface (30A) ;
and
a single wire means joined at its ends for forming an endless loop structure having a first (12A) and a second (12B) loop both of which pass through said first sleeves (24), said second loop (12B) additionally passing through said second sleeves (32) the elastic energy of said first (12A) and said second (12B) loops creation tension in said first and said second fabric means so that said second surface (30A) is displaced away from said first surface (20A) to create an interior space of said structure.



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Field of the Invention

This invention relates to structures and more particularly to portable self erecting structures such as hiking or camping tents, beach shelters or the like.

Background of the Invention

Portable structures such as tents have existed far back into human pre-history, paralleling the nomadic lifestyle of early man. One of the principle problems associated with portable structures is the difficulties associated with erecting them. In earlier versions, it was required that several fabric portions be assembled and that various poles, ropes and stakes be rigged to create a framework which would support the fabric. In more modern versions, improvements have been made to simplify the erection process, as is shown by the following patents:

In U.S. Pat. No. 3,960,161 issued to Norman, a coil of flat spring steel is released to form a saddle structure which lifts a fabric cover or roof up above a fabric floor which is secured to the ground with stakes.

In U.S. Pat. No. 3,990,463 also issued to Norman, a similar frame of flat spring steel is used to form a "Figure 8" structure which is draped with tent fabric and staked down at the edges to form the tent.

Finally, in U.S. Pat. No. 4,358,634 issued to McLeese, multiple arched loops of spring steel are joined together with clamps to form a base framework and a series of upper saddle shaped structures around which an enclosing tent fabric is attached.

Although all of these embodiments offer some advantages over the more primitive and complex earlier types of structures, they still suffer the disadvantages of complex inner structures which in some cases require staking to the ground to function and which have the further disadvantage of multiple loops or clamps which are required to form the structure. These multiple clamps add to the complexity and cost of manufacturing the structure and also reduce the reliability of the structure since each clamp adds a potential failure point where the release of the end of a loop under tension will cause a dramatic failure of the overall structure and may even cause injury if a person is in the vicinity.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to overcome the shortcomings, inefficiencies and limitations of prior self erecting portable structures through the use of a new and improved structure.

Another object of the present invention is to provide an improved self erecting portable structure which has a simple internal frame which allows man-

ufacture at low cost.

Another object of the present invention is to provide an improved self erecting portable structure which has a simple internal frame in which a single rod or wire is joined at its ends with a single connector to form the framework of the structure.

Another object of the present invention is to provide an improved self erecting portable structure which has a simple internal frame in which a single rod or wire is joined at its ends with a single connector to form a structure of higher inherent reliability.

According to the present invention, a self erecting portable structure is provided which comprises a single rod or wire joined at its ends by a single connector to form an endless loop structure comprising at least a first lower loop means and a second upper loop means. A first fabric means having sleeves at each end is provided in a transverse position such that one portion of the first lower loop means and another portion of the second upper loop means is contained in the sleeve at one end of the first fabric means and such that still another portion of the first lower loop means and of the second upper loop means is contained in the sleeve at the other end of the first fabric means. Elastic tension in the first lower loop means and the second upper loop means pulls the first fabric means taut to form a first lower surface of the structure. A second fabric means having sleeves at each end is provided in a longitudinal position such that one portion of the second upper loop means is contained in the sleeve at one end of the second fabric means and such that another portion of the second upper loop means is contained in the sleeve at the other end of the fabric means. Elastic tension in the second upper loop means pulls the second fabric means taut to form a second upper surface of the structure which is separate from the first lower surface so that an interior structure space is created which can be accessed from all sides of the structure. Further, the interior structure space is created without the need for external stakes, pegs or ropes and without the need for internal poles or supports.

Because of the elastic nature and the endless loop structure formed by the single rod or wire joined at its ends by a single connector, the first lower loop means and the second upper loop means together with the accompanying fabric means can be readily folded in upon themselves to form four loops of smaller diameter. The elastic energy of this folded structure is easily contained by strap and a zippered cover so that the complete structure is portable and easily stored in a closet or the trunk of an automobile. When the folded structure is removed from its storage cover, the stored elastic energy allows the structure to "pop up" into its final configuration with no further action from the user, thus providing the self erecting feature which makes the structure so convenient to use.

The present invention can be employed in a wide

variety of forms by changing the size and shape of the first and the second fabric means and of their sleeves. Thus, the present invention can take the form of a completely closed camping tent with screened doors and windows as required or the form of an open ended sun screen or beach shelter which can be accessed from the front and sides without sacrificing the features of being self erecting and highly portable.

These and other objects, features and advantages of the present invention, as well as details of the preferred embodiment thereof, will be more fully understood from the following description and drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side view of the self erecting portable structure according to the present invention.

Figure 2 is a top view of the self erecting portable structure according to the present invention.

Figure 3 is a pictorial view of one embodiment of the self erecting portable structure according to the present invention in which the structure is completely enclosed and has a door.

Figure 4 is a pictorial view of another embodiment of the self erecting portable structure according to the present invention in which the structure is adapted as an open ended sun screen or beach shelter.

DETAILED DESCRIPTION OF THE INVENTION

Figures 1 and 2 have been created to show a minimal embodiment which can be used to illustrate the essential features of the present invention. Referring to the side view of Figure 1 and the corresponding top view of Figure 2, self erecting portable structure 10 comprises a single rod or wire 12 joined at its ends by a single connector 14 to form an of endless loop structure having a first lower loop means 12A and a second upper loop means 12B. A first fabric means 20 having a sleeve 22 at one end and having a sleeve 24 at the other end is provided in a transverse position such that one portion 12C of the first lower loop means 12A and another portion 12D of the second upper loop means 12B is contained in sleeve 24. Correspondingly, another portion 12E of the first lower loop means and a portion 12F of the second upper loop means is contained in the sleeve 22 at the other end of the first fabric means 20. Elastic tension in the first lower loop means 12A and the second upper loop means 12B pulls the first fabric means 20 taut to form a first lower surface of the structure. A second fabric means 30 having a sleeve 32 at one end and having a sleeve 34 at the other end is provided in a longitudinal position such that one portion 12G of the second upper loop means 12B is contained in sleeve 32 and such that another portion 12H of the second upper loop means 12B is contained in sleeve

34. Elastic tension in the second upper loop means 12B pulls the second fabric means taut to form a second upper surface 30A of the structure which is separate from the first lower surface 20A so that an interior structure space 40 is created which can be accessed from all sides of the structure. Further, this interior structure space is created without the need for external stakes, pegs or ropes and without the need for internal poles or supports.

Figures 1 and 2 clearly demonstrate the endless loop structure of rod or wire 12 joined at its ends by single connector 14 since it can be seen that both rod portions 12C and 12D form transitions between first lower loop means 12A and second upper loop means 12B as they pass through sleeve 24 while rod portion 12E both enters and exits sleeve 22 from first lower loop means 12A and rod portion 12F both enters and exits sleeve 22 from second upper loop means 12B.

Figure 3 shows a more practical embodiment of the present invention in the form of a fully enclosed hiking or camping tent. In this embodiment, the first lower fabric means has been expanded to form the floor 50 of the tent while the second upper fabric means has been expanded to provide a roof 52, a back side 54 (hidden in this view) and a front side 56. A screen door 58 has been added to allow entrance and exit to the tent. Additional fabric portions 60 and 62 have been added to form enclosing connections between the roof 52, the back side 54, and the front side 56. The sleeve means of the minimal embodiment of Figures 1 and 2 have been extended to form sleeve portions 66, 68, 70 and 72 which contact the periphery of each of the fabric portions and additionally function as the seams which interconnect the entire structure together. Figure 3 also shows schematically (as a dotted line) a continuous rod or wire means 74 passing through all of the sleeve portion 66-72 as an endless loop with rod portions 74A and 74B performing the transitions from a first lower loop means 74C to a second upper loop means 74D as was originally described for the minimal embodiment of Figures 1 and 2.

Figure 4 shows still another practical embodiment of the present invention in the form of an open ended sun shade or beach shelter. In Figure 4, the first lower fabric means of the minimal embodiment is once again extended to form a floor portion 80 of the shelter. The second upper fabric means of the minimal embodiment is similarly extended to form a roof and back portion 82. The sleeve means of the minimal embodiment have also been extended to form sleeve portions 84 and 86 which surround the periphery of the fabric portions to form the seams which interconnect the fabric portions and simultaneously containing the endless loop of the continuous rod means (not shown). Fabric gussets 88 are added to stabilize the structure.

In the embodiments of Figures 3 and 4, a practi-

cal method of implementing the rod or wire means forming the endless loop is to use a spring steel wire which is covered with a rubberized coating to minimize abrasion to the fabric sleeve. Other elastic materials such as fiberglass or graphite fiber rods would also be suitable.

Both of the embodiments of Figures 3 and 4 are designed to function successfully without stakes or pegs since they can be held in place on the ground by the weight of the occupants or the weight of items stored inside them. In the case of the beach shelter of Figure 4, another convenient method is to use the attached pockets 90 which can be filled with sand to provide anchors which will hold the shelter in place. Although not required, there is no reason why the embodiments of the present invention cannot also make use of stakes or pegs if they are desired.

In both of the embodiments of Figures 3 and 4, because of the elastic nature and the endless loop structure formed by the single rod or wire joined at its ends by a single connector, the first lower loop means and the second upper loop means together with the accompanying fabric means can be readily folded in upon themselves to form four loops of smaller diameter. The elastic energy of this folded structure is easily contained by a strap and a zippered cover so that the complete structure is portable and easily stored in a closet or the trunk of an automobile. When the folded structure is removed from its storage cover, the stored elastic energy allows the structure to "pop up" into its final configuration with no further action from the user, thus providing the self erecting feature which makes the structure very convenient to use.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that changes in form and detail may be made therein without departing from the spirit and the scope of the invention.

Claims

1. A self erecting portable structure comprising:
 - single rod means joined at its ends by a single connector for forming an endless loop comprising at least a first lower loop means and a second upper loop means;
 - first fabric means in a transverse position for forming a first lower surface;
 - first sleeve means coupled to one end of said first fabric means for enclosing a first portion of said first lower loop means and enclosing a first portion of said second upper loop means;
 - second sleeve means coupled to the other end of said first fabric means for enclosing a second portion of said first lower loop means and enclosing a second portion of said second upper

loop means so that the elastic energy in said first lower loop means and in said second upper loop means pulls said first fabric means taut to form said first lower surface;

second fabric means in a longitudinal position for forming a second upper surface;

third sleeve means coupled to one end of said second fabric means for enclosing a third portion of said second upper loop means;

fourth sleeve means coupled to the other end of said second fabric means for enclosing a fourth portion of said second upper loop means so that the elastic energy in said second upper loop means pulls said second fabric means taut to form said second upper surface which separates from said first lower surface to create an interior structure space.

2. The self erecting portable structure according to Claim 1 wherein said first fabric means and said first and said second sleeve means extend to form the floor of said structure.
3. The self erecting portable structure according to Claim 2 further comprising fabric means coupled to said first fabric means and said second fabric means to completely enclose said interior structure space.
4. The self erecting portable structure according to Claim 3 further comprising fabric means coupled to said first fabric means and said second fabric means to only partially enclose said interior structure space.
5. The self erecting portable structure according to Claim 3 wherein said structure comprise a hiking or camping tent.
6. The self erecting portable structure according to Claim 5 wherein said hiking or camping tent further comprises a door to allow entrance to and exit from said tent.
7. The self erecting portable structure according to Claim 4 wherein said structure comprises a sun shade or beach shelter having open sides and having an open front.
8. The self erecting portable structure according to Claim 1 wherein said single rod means further comprises a spring steel wire.
9. The self erecting portable structure according to Claim 8 wherein said spring steel wire has a rubberized coating.
10. A method for making a self erecting portable

structure comprising the steps of:

providing single rod means joined at its ends by a single connector for forming and endless loop comprising at least a first lower loop means and a second upper loop means;

providing first fabric means in a transverse position for forming a first lower surface;

providing first sleeve means coupled to one end of said first fabric means for enclosing a first portion of said first lower loop means and enclosing a first portion of said second upper loop means;

providing second sleeve means coupled to the other end of said first fabric means for enclosing a second portion of said first lower loop means and enclosing a second portion of said second upper loop means so that the elastic energy in said first lower loop means and in said second upper loop means pulls said first fabric means taut to form said first lower surface;

providing second fabric means in a longitudinal position for forming a second upper surface;

providing third sleeve means coupled to one end of said second fabric means for enclosing a third portion of said second upper loop means;

providing forth sleeve means coupled to the other end of said second fabric means for enclosing a forth portion of said second upper loop means so that the elastic energy in said second upper loop means pulls said second fabric means taut to form said second upper surface which separates from said first lower surface to create an interior structure space.

11. The method for making a self erecting portable structure according to Claim 10 wherein said first fabric means and said first and said second sleeve means extend to form the floor of said structure.

12. The method for making a self erecting portable structure according to Claim 11 further comprising fabric means coupled to said first fabric means and said second fabric means to completely enclose said interior structure space.

13. The method for making a self erecting portable structure according to Claim 11 further comprising fabric means coupled to said first fabric means and said second fabric means to only partially enclose said interior structure space.

14. The method for making a self erecting portable structure according to Claim 12 wherein said structure comprises a hiking or camping tent.

15. The method for making a self erecting portable structure according to Claim 14 wherein said hiking or camping tent further comprises a door to allow entrance to and exit from said tent.

16. The method for making a self erecting portable structure according to Claim 13 wherein said structure comprises a sun shade or beach shelter having open sides and having an open front.

17. The method for making a self erecting portable structure according to Claim 14 wherein said single rod means further comprises a spring steel wire.

18. The method for making a self erecting portable structure according to Claim 17 wherein said spring steel wire has a rubberized coating.

19. The method for making a self erecting portable structure according to Claim 14 wherein said endless loop is folded to form four smaller loops for compact storage of said structure.

20. The method for making a self erecting portable structure according to Claim 16 wherein said endless loop is folded to form four smaller loops for compact storage of said structure.

21. The self erecting portable structure according to Claim 5 wherein said endless loop is folded to form four smaller loops for compact storage of said structure.

22. The self erecting portable structure according to Claim 7 wherein said endless loop is folded to form four smaller loops for compact storage of said structure.

23. A self erecting portable structure comprising:
a first fabric means having first sleeves at each end forming a first surface;
a second fabric means having second sleeves at each end for forming a second surface; and

a single wire means joined at its ends for forming an endless loop structure having a first and a second loop both of which pass through said first sleeves, said second loop additionally passing through said second sleeves, the elastic energy of said first and said second loops creating tension in said first and said second fabric means so that said second surface is displaced away from said first surface to create an interior space of said structure.

24. A method for making a self erecting portable structure comprising the steps of:

providing a first fabric means having first sleeves at each end forming a first surface;

providing a second fabric means having second sleeves at each end for forming a second surface; and

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providing a single wire means joined at its ends for forming an endless loop structure having a first and a second loop both of which pass through said first sleeves, said second loop additionally passing through said second sleeves, the elastic energy of said first and said second loops creating tension in said first and said second fabric means so that said second surface is displaced away from said first surface to create an interior space of said structure.

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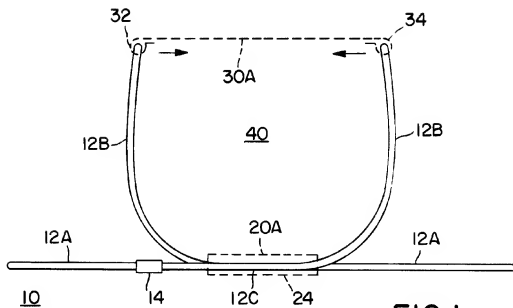


FIG. 1

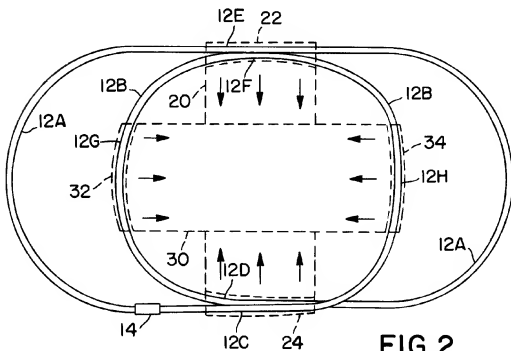


FIG. 2

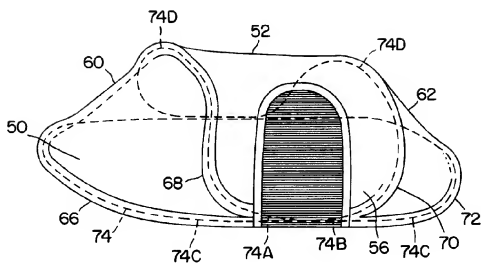


FIG. 3

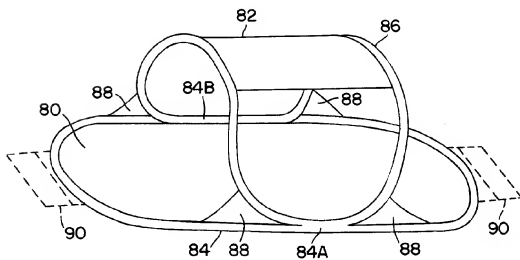


FIG. 4

European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 31 0834

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D, A	US-A-4 858 634 (MCLEESE) * column 4, line 18 - line 38 * * column 5, line 14 - line 27 * * column 6, line 18 - line 54; figures 5,16-20,22 * -----	1-3, 5, 8, 10-12, 14, 15, 17, 19-24	E04H15/40
D, A	US-A-3 990 463 (NORMAN) -----		
D, A	US-A-3 960 161 (NORMAN) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E04H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 02 FEBRUARY 1993	Examiner PORWOLL H.P.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure I : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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